International Journal of Clinical Trials
Mishra L et al. Int J Clin Trials. 2025 Feb;12(1):69-73
http://www.ijclinicaltrials.com
pISSN 2349-3240 | eISSN 2349-3259
DOI: https://dx.doi.org/10.18203/2349-3259.ijct20250135

Review Article

Clinical trials unveiled: an overview of key concepts, strategies and challenges

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Received: 17 September 2024
Revised: 09 November 2024
Accepted: 02 December 2024

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ABSTRACT

Carrying out clinical trials is essential for pushing forward the cause of medical science in that such is a stance from which it is possible to provide the proofs necessary for sanctioning new treatment methods including making sure they are safe and generally efficient. Clinical research help researcher to discover new medications to treat, prevention, mitigation of prevailing disease. Because of clinical trial many effective treatments in field of disease, vaccines are available which are quite more effective than the marketed drugs. It can also be said that the clinical research would not be successful without participating subjects. The participating volunteers are irrespective of healthy or have a medical condition. People of any age and backgrounds can participate in the trial. Usually, clinical trials are characterized by multiple problems such as poor recruitment, ethical problems, regulatory issues, and exorbitant prices. The present paper gives a glimpse of the manner in which clinical trials are usually followed, the stages that are typically covered throughout, not forgetting, the most crucial barriers which are involved.

Keywords: Clinical trials, Inform consent, Impartial witness, Inform assent, Legally acceptable representative, Medical science, Regulatory

INTRODUCTION

Clinical research is a branch of medical science which include people and aims to improve health of mankind by identifying the process to prevent, diagnose, mitigate and treat disease. Clinical trials are designed for humans to study the impact of various medical, surgical and behavioural interventions. To determine whether a new therapy is both safe and effective or not, the scientists rely on them. It is the study among the healthy or ill patients irrespective of age is included in the study. In clinical research usually, patient consent is required in which they agree to be part of the study.[1] After the screening phase subjects or participants are explained about the process to be followed in the trial (number of visits, demographic, medical investigation etc include in the study). They are also informed that they hold the right to withdraw from the study at any stage.

After that if the participant wants to be part of trial then he/she signs the inform consent form.[1]

Aim of the clinical trial

Aim was to identify ways for early diagnosis of disease even before onset of symptoms, to improve the health of future generation and identifying ways to prevent health problems, including in people who are healthy but at increased risk of developing a disease.

METHODS

The review of multiple paper was done based on clinical trial process. How it is being done, data collection methodology, document required and process followed.

Inform consent

A fundamental principle of clinical trials, which requires that patients receive and understand the information provided to take a sole decision to participate the study.[1]

The participants are informed that they hold the right to withdraw from the study at any stage. After that if the participant wants to be part of trial, then he/she signs the inform consent form through which they provide a token of acceptance to be part of trial. While signing the inform consent form main criteria's to be followed are: After signing the inform consent, the copy of the same should be provided to the participant, in case of adult (above 18 years), the participant can solely sign the inform consent form. In case of children (below 18 years), "legally acceptable representative (LAR)" mainly their parents provide the consent that they are giving the right that their child can participate in the trial. In case of children inform consent form is known as "inform assent form". In case of illiterate person, the illiterate participant has provided thumb impression along with Impartial Witness signature. "Impartial witness" is the person who has understood the trial proceeding and is taking the custody of the illiterate of the participant taking part in the trial.

In the clinical research the participating volunteers are screened, it is known as "screening phase". Screening Phase is the qualifying phase in which certain characteristics are consider as eligible to participate in the study known as inclusion criteria. Also, with certain characteristics may not allow to participate in the study known as exclusion criteria. After qualifying screening phase subjects are assigned with unique ID or enrolment IDS because the details of the subject will be kept confidential. After that Schedule first visit is the baseline visit which undergoes physical test. Then the trial testing leads to assigning of treatment or control group. Treatment group get the intervention being tested whereas control group will get nothing (placebo) or the marketed product. In order to ascertain the effects of interventions systematically, clinical trials adhere to strict procedures and are arranged into phases. Although they have critical role in advancement in health ground, still they face several challenges.[1]

DECLARATION MADE ON CLINICAL TRIALS

Declarations made on clinical trials often involve ethical and scientific guidelines to ensure the integrity of the research and the safety of participants.

Here are some key declarations and documents related to clinical trials:

Declaration of Helsinki

As mentioned earlier, this document outlines ethical principles for medical research involving human subjects. It emphasizes the need for informed consent, the necessity of independent ethical review, and the importance of scientific integrity.[2]

International conference on harmonisation guidelines

Specifically, the ICH E6 guideline for good clinical practice (GCP) provides a uniform standard for designing, conducting, recording, and reporting clinical trials. It aims to ensure that clinical trials are conducted ethically and that the data generated is credible and accurate.[2]

Nuremberg code

After World War II, this code was one of the first documents to address research ethics. It emphasizes the necessity of voluntary consent from research participants and the need to avoid unnecessary physical and mental suffering.[2]

Belmont report

This U.S. report provides ethical principles and guidelines for research involving human subjects. It focuses on respect for persons, beneficence, and justice. It underpins the ethical standards applied in U.S. research institutions.[2]

CIOMS guidelines

The council for international organizations of medical sciences (CIOMS) provides guidelines for ethical aspects of medical research, especially in developing countries. These guidelines complement the Declaration of Helsinki and address issues such as informed consent and the assessment of risk and benefit.[2]

Common rule

This is the U.S. federal policy for the protection of human subjects, which provides regulations for ethical research conduct and the establishment of institutional review boards (IRBs) to review research proposals.[2]

Good clinical practice guidelines

These are detailed guidelines that provide a framework for clinical trials, ensuring the safety of participants and the reliability of trial data. They are widely adopted and often align with the ICH E6 guidelines.[2]

Each of these declarations and guidelines plays a critical role in ensuring that clinical trials are conducted with high ethical standards and that the rights and well-being of participants are safeguarded.

DIFFERENT TYPES OF CLINICAL TRIAL

Clinical trials can be classified into different kinds as:

Treatment research: It includes invention in field of medication, new devices etc

Prevention research: It helps in preventing disorder in developing or coming back. Ongoing prevention research are vaccines, medicines, vitamins etc

Diagnostic research: This helps in identifying a particular disorder.

Screening research: It is said to be the best way to identify a particular disorder.

Based on blinding of the study the clinical trial can be classified as follows:

Single blind: Only one part is blind. Mainly the participant is blind and is unknown of intervention provided.

Double blind: Here researcher and participant both are blinded. Only Investigator is aware of the intervention provided to the Participant.

Triple blind: Participant, researcher, experimenter and analysing data all are blinded in the study.

Reasons to participate in clinical trials

A person can participate to contribute in invading new medicaments and help future generation. By contributing, one can feel like take a crucial role in field of health science. In case of person has no treatment for the health problem.

DISCUSSION

After closure of the trial

Upon closure of the clinical trial, the researcher and the auditor determine the mean, standard deviation and other data for the clinical trial and plan the next process to follow. After correction and analysing data is locked. As per regulatory authority data can be changed within one year not more than that.[3]

What happens if a patient gets hospitalised during trial

The researcher staff collect the information and well-being of the volunteer. Along with the medical information collected the details is submitted within 24 hours for initial reporting to CDSCO.

The details follow up medical health status submitted within 14 days.[3]

Phases of clinical trials

Clinical trials are done different stage in which each one has a specific role, purpose and objective:

Phase I

Objective: to observe safety, efficacy and side-effects.

Description: In this phase, there are only a few health volunteers (20-100) or patients. The main aim is to establish the treatment's safety profile and the right dosage.[4]

Phase II

Objective: To evaluate therapeutic efficacy and further safety.

Description: Phase two tests are carried out on a more significant number of patients, ranging from one hundred to three hundred. This objective is to determine how well the medication works while still tracking its safety. Here, the purpose lies behind availing initial information on the possible effectiveness of the identified course or therapy in specific patients with given diseases or conditions.[4]

Phase III

Objective: To compare with standard treatment, monitor therapeutic efficacy, safety.

Description: At this stage, the drug is given to large numbers of patients/subjects (1,000-3,000) to demonstrate efficacy, monitor side effects, and compare it with standard treatment or placebo. Phase III trials are meant for getting regulatory approval with extensive data.[4]

Phase IV

Objective: It helps to collect additional information of marketed drug.

Description: Post-marketing clinical trials gather further information concerning the risks, benefits, and optimal usage of a drug. In a larger population, knowledge of the long term effects is critical in phase IV trials.

Challenges in clinical trials

Recruitment and retention

Post-marketing clinical trials gather more information about the risks, benefits, and proper use of a drug while knowledge concerning the long-term effects on a larger population is crucial during phase IV trials.[5]

Ethical considerations

At clinical trials, ethical issues such as valid consent and risk-benefit ratio have always been treated with utmost importance for the well-being of the patients. Concerning the study at hand, participants ought to be well versed and freely express their wish to partake in it is an obligation of any research worker.

Striking a balance between potential gains and its risks, while keeping an open book is very crucial.[5]

Regulatory hurdles

It's quite complicating moving around in the world of regulations as it requires quite some time. Countries have their own set of rules to govern them hence there is a possibility of postponement.

However, it is of utmost importance for trial sponsors to meet the necessary standards although this may be seen as quite a big mountain which need climbing.[5]

Cost and funding

"Clinical trials is an expensive endeavor frequently running into millions of dollars. It has limitations as far as funding is concerned which may also be restricting range of inquiry and eventual halting of investigation unseasonably.

There are high expenses incurred during recruitment process of subjects, their health surveillance, and handling the huge volume of data gathered".[5]

Data management

Significant challenges are posed by managing the large volumes of data generated in clinical trials. It is important to ensure data integrity, confidentiality, and compliance with regulations such as the good clinical practice (GCP) and the general data protection regulation (GDPR).[5]

Globalization of clinical trials

Conducting multinational trials exposes us to many patient populations from diverse backgrounds, but at the same time it presents complications related to regulatory requirements, cultural diversity, and logistical issues. One of the biggest hurdles that must be overcome is how to guarantee uniform execution of trials at all these places around the globe.[5]

Patient diversity and representation

To generalize the results, clinical trial participants should represent the population diversity. But, representing enough number of minorities, females, and older individuals in clinical trials is still a big problem.[5]

Strategies to overcome challenges

Improving recruitment and retention

Patient engagement: By increasing idea and education about clinical trial in social media and through institution can increase patient engagement.[6]

Flexible design: By adapting trial designs and eligibility criteria can facilitate the inclusion of a more diverse patient population.[6]

Patient-centric approach: By approaching patient requirement and by improving clinical trial experience through better communication and by supporting participant can help to retain more participants.[6]

Ethical practices

Informed consent: should develop clear, simple and concise consent form which would provide clear knowledge about the trail being conducted and they are being part of.

Independent review: Ethics committee should review regularly to ensure that the trail is conducted ethically.

Regulatory strategies

Harmonization: Effort is required to harmonize ethical rule across country to improve the approval process.[7]

Early engagement: Regulatory authorities should be engaged at early stage of study design to ensure potential support.

Cost management

Efficient design: Adaptive trial (innovative trial design) should be used to reduce cost and make trial cost efficient.

Collaboration: Collaboration should be made with institution, labs etc to make the trial reduce cost and cost efficient.[7]

Data management solutions

Advanced technologies: Data management can be improved by introducing electronic data capture (EDC) and cloud computing and the artificial intelligence (AI).[7]

Standardization: Data integration and analysis can be facilitated by adopting standardized data and protocols.[7]

Enhancing diversity

Community engagement: By working with institutions, labs, stakeholders can improve trust.[7]

Tailored recruitment strategies: Culturally sensitive recruitment materials and strategies can be developed to enhance diversity in trial population.[7]

CONCLUSION

Clinical research is vital for enhancing medical information and improving patient services, but they come across various obstacles. The use of new approaches in the conductance of trials as well as making use of technological developments can improve trials' performances thus overcoming these challenges. In order to be successful, patient recruitment needs to be boosted, costs managed effectively, there should be respect for ethical values when conducting such research plans; furthermore, data management processes have to be enhanced through better regulations.

ACKNOWLEDGEMENTS

Authors would like to express my gratitude to Ms. Pratikshya Pattnaik for her valuable recommendation for this literature review at planning stage.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Asahara T, Murohara T, Sullivan A, Silver M, van der ZR, Li T, et al. U.S. Food and Drug Administration. Clinical Trials: Phases of Clinical Trials. Retrieved from FDA. 1992;300-967.
2. Nadal-Ginard B, Fuster V. World Health Organization. Clinical Trials. 2010;7:1.
3. Srivastav D, Ivey KN. National Institutes of Health. NIH Clinical Trials. 2009;147-9.
4. Dimmeler S, Zeiher AM, Schneider MD. European Medicines Agency. 2007;575-600.
5. Huribut WB. National Cancer Institute. Clinical Trials Information. 2018;789-900.
6. Barnes M, Florencio PS. Challenges to Ethical Conduct of Clinical Trials in Developing Countries. Neurosurgery. 2002;52(5):1363-7.
7. Emanuel EJ, Wendler D, Killen J, Grady C. What makes clinical research in developing countries ethical? The benchmarks of ethical research. J Infect Dis. 2004;189(5):930-7.

Cite this article as: Mishra L, Pattnaik PP, Pattnaik M, Patra JK, Pati S, Nayak S. Clinical trials unveiled: an overview of key concepts, strategies and challenges. Int J Clin Trials 2025;12(1):69-73.